uneven-age management of northern hardwoods in New England

FOREST SERVICE/U.S. DEPARTMENT OF AGRICULTURE

The information in this publication is based on research by William B. Leak and Stanley M. Filip, silviculturists at the Forest Service's Forestry Sciences Laboratory in Durham, New Hampshire.

Sooner or later many forest landowners remove some timber from their property. Once they've decided to cut, they have a choice of methods to use. Each of the main cutting methods - even and uneven-age management - has its advantages, depending on what the landowner wants to achieve by cutting.

A common use for even-age management in New England northern hardwoods is to grow maximum amounts of birch and ash, species that don't regenerate or grow well in deep shade.

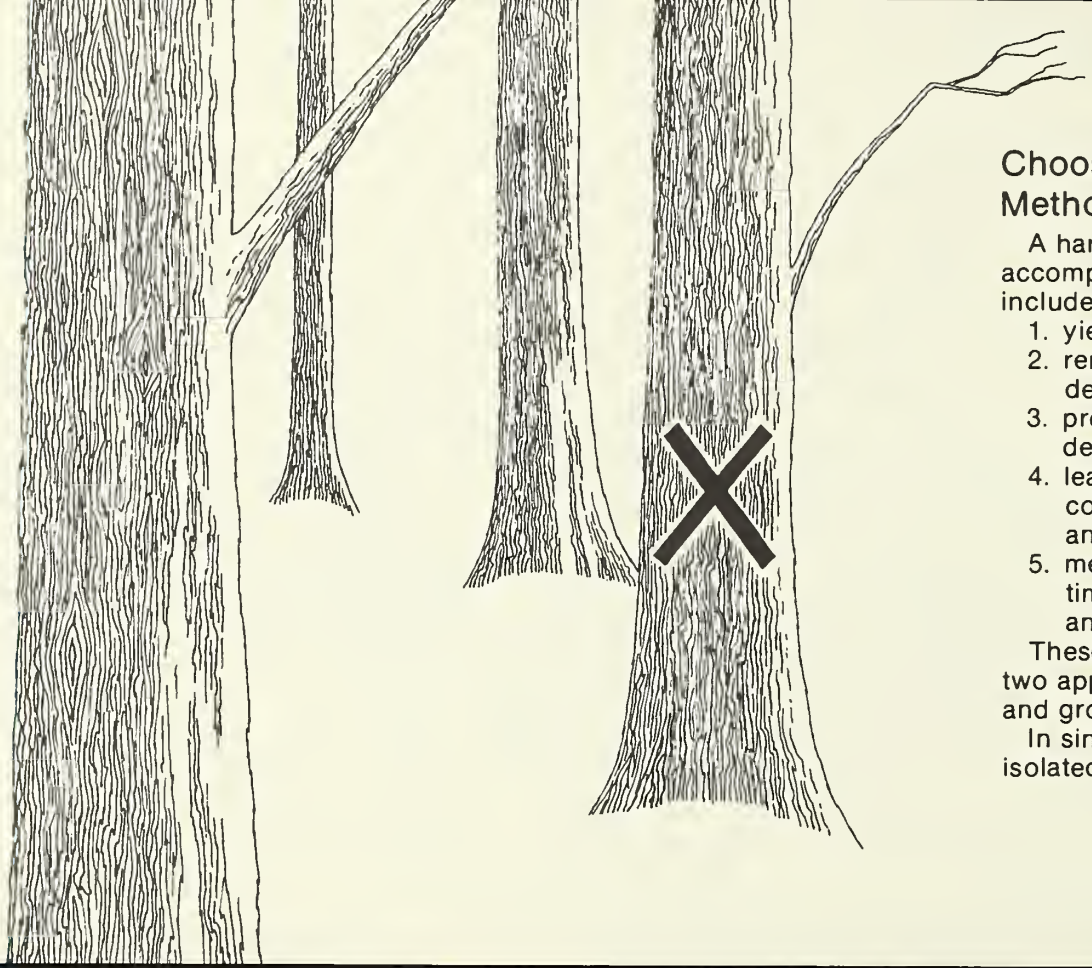
Uneven-age management, on the other hand, encourages a greater proportion of shade-tolerant species. Under this plan, trees grow and are harvested in an intimate mixture of age classes. Trees of one age may grow side-by-side with trees of a different age. Even when groups of like-aged trees do occur, they are usually on less than an acre of land and are not large enough to manage as even-aged stands.

When choosing between the two management plans, landowners should also consider such factors as their objectives, the market status, management and utilization costs, and non-timber values such as asthetics and wildlife.

This booklet describes the principles to follow in uneven-age management of forest lands. The three main subjects covered are:

1. choosing a harvest cutting method
2. controlling timber yields
3. removing timber products

The focus is on the economical and flexible aspects of uneven-age management. Under this plan, trees can be grown either by extensive silviculture, requiring small investments, or by intensive silviculture, calling for larger outlays.



Choosing a Harvest-Cutting Method

A harvest-cutting method should accomplish several objectives. They include:

1. yield a profit
2. remove trees that are mature, dead or dying, or defective
3. provide regeneration of the desired species
4. leave the remaining stand in good condition for continued growth and development of future crops
5. meet owner objectives for non-timber values such as aesthetics and wildlife.

These objectives can be met through two approaches: single-tree selection and group selection.

In single-tree selection, individual, isolated trees that are mature (growth

and quality have peaked), high risk or defective are removed. This method is the most flexible way to remove trees that should be taken. It favors regeneration of mostly shade-tolerant species such as beech, sugar maple, hemlock, and red spruce.

In group selection, trees are removed in small groups ranging from a few trees to nearly an acre. If the understory is of a desirable species and quality, groups of mature or defective overstory trees can be marked and cut to favor growth of the understory. If the understory is undesirable, all trees larger than about two inches in diameter within a chosen boundary can be cut.

Sometimes called patch selection or small-patch cutting, this method encourages regeneration of species that require direct sunlight, such as yellow birch, paper birch, and white ash.

Logging costs are about the same for both approaches. So, making a profit depends on removing enough timber. The recommended minimum is 4 to 6 cords per acre, or 20 to 25 sq. feet of basal area per acre.

To leave the stand in good condition for future crops, use a combination of cutting methods. Use group selection to encourage regeneration and to minimize logging damage. Use single-tree selection to harvest mature, high-risk, or defective trees between groups.

Controlling Timber Yield

The first step in controlling yields in uneven-aged stands is to decide on a desirable density and diameter distribution in the stand that remains after cutting. Next, choose a marking procedure that will let you reach this goal. And last, find a way to project growth and thus predict a yield from future cuts.

Yield regulation in uneven-aged forests is complex. The degree or importance of control is a matter for individual owners to decide according to their own objectives. There are, however, two general principles to follow for any property:

1) Use economically sound marking and cutting practices. "Economical" will mean different things to different owners.

2) Leave enough trees to meet the minimum requirements for density and structure in order to maintain good productive capacity.

These principles can be applied through marking practices and residual stand goals.

When marking trees, keep in mind the goals of the harvest-cutting method to be used, whether it be single-tree or group selection. Mark overstory trees that are mature, high-risk, or defective. As a rule, grow mature trees no larger than 20 to 22 inches d.b.h. in New England northern hardwood forests. Mark small trees where it will lead to profit or an improved stand. Examples are trees that would be damaged or isolated by cutting, inferior or undesirable trees of almost sawtimber size (11 inches d.b.h.), and defective trees or poor species growing among young even-age trees on a good site. To limit investment by practicing extensive silviculture, concentrate on marking saleable trees and removing sawtimber-size culls. For larger outlays under intensive silviculture, plan on removing cull or defective pole-sized trees (5 to 11 inches d.b.h.), and on improving quality, species, and spacing in young even-age groups.

Use rules of thumb to help regulate the marking operation and to distribute marked trees evenly over the stand. One suggested guideline is to mark trees proportionately over the whole area to be cut. For example, to remove ¼ of the basal area by group selection, mark no more than a single ¼-acre group on each acre of forest land. When removing 1/3 of the sawtimber by single-tree selection, mark an average of one out of every three sawtimber trees. Or monitor the residual stand by point (prism) sampling.

To mark merchantable trees individually, spot them with paint. Use X's on cull trees or small trees of questionable value. The logger could fell these and take them, or kill them later in a timber-stand improvement (TSI) operation. When removing entire groups of trees (patches), mark the borders of the area with paint. If merchantable, trees within the border can be harvested. If not, they can be felled and left, or later killed in a TSI operation.

The residual stand should contain 65

to 80 square feet of basal area per acre in trees 5 or 6 inches d.b.h. and larger. Of these, at least 30 square feet per acre should be good quality, sawtimber-size trees. Sawtimber will grow better with more than this amount. These goals apply to New England northern hardwoods whether single-tree selection, group selection or a combination of these methods is used.

Graphs can offer evidence of the success of different cutting practices, and the need for remedial action. Ideally, when the number of trees is plotted against the d.b.h. class, a J-shaped or slightly S-shaped curve should result. This should occur whether sawtimber, or both sawtimber and poletimber are cut.

A bell-shaped or lumpy curve indicates trouble. A bell-shaped curve is especially critical, since it points to inadequate regeneration and early development. To correct the problem, use a harvest-cutting method that encourages more and better regeneration, leave a less dense overstory,

a new patch cutting . . . .

or control biological factors such as grazing or deer damage.

A lumpy curve probably represents a temporary problem. The result of past cutting practices, it can be corrected by removing trees in d.b.h. classes showing an excess.

Following cutting, growth will average about 2 square feet of basal area per year for trees 5 or 6 ~~feet~~ d.b.h. and larger. This figure, equal to about 40 to 50 cubic feet of wood, will occur for 10 to 20 years, or until the next cut. Some stands will do better, some worse. Expect to find ½ to ¾ of the growth occurring in sawtimber trees, in stands containing 30 or more square feet of sawtimber. Among smaller trees that are not being cut, growth will eventually move toward zero due to natural mortality. In stands where sawtimber trees are cut and smaller sizes are left, growth will stabilize at approximately 1.5 square feet per acre. (¾ x 2 sq ft.), most of which will be sawtimber growth.

. . . . . and a patch cutting 10 to 15 years later

Removing Timber Products

Trees are cut every 10 to 20 years in uneven-age management. The main concerns during the operation are to minimize costs and protect the residual stand. Both conditions can be met by limiting the number of truck roads and main skid roads, using the following guidelines:

1) Truck roads are the most expensive part of the removal system. How much road is needed depends on the skidding distance for the particular equipment and terrain. If the maximum skidding distance is 1000 feet, a mile-long road will service as much as 240 acres of timberland. Lay roads out carefully in a permanent location, water-bar (stabilize) them after logging, and reopen them for new operations.
2) Locate main skid roads, made by bulldozing, every few hundred feet along the truck road. Make them fairly straight, sloping no more than 15 to 20 percent, and close to the greatest amounts of marked timber. Water-bar main skid roads after logging. For successive operations, reroute when necessary to give better access to marked timber.
3) Secondary skid roads, on which timber is skidded or winched to main skid roads, usually don't require bulldozing. The logger locates these where he needs them.
4) Treat slash according to state or local regulations. Trees will regenerate better in areas where group selection was used and the understory removed, if slash is cut up or lopped so that it lies close to the ground.
5) Minimize felling damage by using group selection in tight situations, and by close supervision.

main skid roads should offer the best access to marked timber

Forest Service Research in the Northeast

The northeastern United States is a region of many contrasts. It houses nearly a third of the nation's 200 million people on less than one-eighth of the country's total land area. Despite vast urbanization characterized by a sprawling megalopolis from Boston to Washington, D.C., the region is heavily forested.

Trees cover over one-half of the land in the northeast. These 105 million tree-covered acres produce 14 percent of the region's industrial output. Timber-based industries contribute eight billion dollars annually to the area's economy.

One-fourth of the nation's pulpmills are located here. They carry a tenth of the national wood pulping capicity. About 2.7 billion board feet of sawlogs are cut here each year.

Over 400 northeastern communities depend on forested municipal watersheds and forest-bounded reservoirs for their water supplies. Thousands more turn to forests for unique recreational opportunities not found in the city. Forests also provide a home for an assortment of wildlife.

This complex area is where 130 scientists of the Northeastern Forest Experiment Station live and work. Forest Service research began here in 1923. Headquarters are in Upper Darby, Pa., with field units in Orono, Me.; Burlington, Vt.; Durham, N.H.; Amherst, Mass.; Hamden, Conn.; Syracuse, N.Y.; Warren, Pa.; Pennington, N.J.; Beltsville, Md.; Delaware, Ohio; Berea, Ky.; Morgantown, W. Va.; Parsons, W. Va.; and Princeton, W. Va.

Forest research in the northeast affects a great deal more than trees — it touches the whole human environment. Its aim is to show the value of trees to people and their environment; to develop the recreation potential of our forests; to improve forest watershed and wildlife habitat management; to upgrade forest commodities; and to expand the forest products market.

In the 54 years since it was established, the Northeastern Station has grown to encompass a wide variety of forest research. The complex demands made on today's forests call for multiple-use research conducted by scientists from many different disciplines.

Forests are one of our few renewable resources. The future will bring new demands on forested lands — demands that research at the Northeastern Station is helping to meet.

For more information on uneven-age management of northern New England hardwoods, write for a copy of research paper NE-332 from:

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